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AND MAINTENANCE OF WAY

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Railway Engineering

and Maintenance of Way

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THE MONTH OF JUNE

¶ "Business is better." Every railroad man will tell you this month. Ask them when you will get another order, either a few of them by word of mouth or many of them through advertising.

TRACK STANDARDS

¶ In connection with this paper we are publishing a new book, Track Standards, which you should know about. It will be sold in combination with a year's subscription to Railway Engineering, the monthly engineering paper of the West.

PROGRESS

¶ The communications, which are published in this paper, have a tendency to keep its readers up-to-date in methods of construction and maintenance. Readers should tell their friends to become subscribers when they find the paper has aroused new interest in their work and promoted progress in their methods.

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CLASSIFIED INDEX OF ADVERTISERS (CONTINUED)

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Rail Joints.
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Rail Saw.
Adreon & Co., St. Louis.
Railroad Equipment and Supplies.
Atlantic Equipment Co., New York.
Buda Foundry & Mfg. Co., Chicago.
Indianapolis Switch & Frog Co., Springfield, O.

Railway Engineering

and Maintenance of Way

Mr. James Carmack has been appointed supervisor of signals of the Northern Pacific, with office at Seattle, Wash.

Mr. C. B. Keiser has been appointed the master mechanic of the Pennsylvania Tunnel & Terminal, with office at New York.

Mr. C. I. Leiper has been appointed supervisor of track of the Pennsylvania Tunnel & Terminal, with office at New York.

Mr. James MacMartin, chief engineer of the Delaware & Hudson, has resigned to go into business for himself.

Mr. George C. Koons, supervisor of the Pennsylvania, has been appointed engineer of the Cumberland Valley, with office at Chambersburg, Pa., succeeding Mr. T. J. Brereton, resigned.

Mr. L. L. Dawson has been appointed superintendent of motive power of the Ft. Worth & Denver City.

Mr. T. H. Croswell, principal assistant engineer of the Northern Pacific, has been appointed chief engineer of the Spokane, Portland & Seattle and the Astoria & Columbia River, with office at Portland, Ore.

Mr. W. J. Hill, general foreman of the Atchison, Topeka & Santa Fe, has been appointed master mechanic of the Oklahoma division, with office at Arkansas City, Kan., succeeding Mr. J. T. Lendrum, transferred.

Mr. W. F. Ackerman has been appointed shop superintendent of the Havelock shops of the Chicago, Burlington & Quincy, with office at Lincoln, Neb., succeeding Mr. F. Kroehler, assigned to other duties.

Mr. H. E. Billman, roadmaster of the St. Louis, Iron Mountain & Southern, has been appointed assistant division engineer of the Southern Kansas divsion, with office at Coffeyville, Kan. Mr. Wade Ray suceeds Mr. Billman, with office at Wichita, Kan.

Mr. Augustus Mordecai, recently engaged in making a valuation of the physical property of the New York, New Haven & Hartford, and previous to that engineer of maintenance of way of the Erie, has opened an office at 1328 Citizens building, Cleveland, Ohio, as consulting and constructing engineer.

Mr. T. J. Raycroft, general foreman of the Chicago, Burlington & Quincy, has been appointed the master mechanic of the Sterling division, with office at Sterling, Colo., succeeding Mr. E. D. Andrews, transferred.

Mr. M. C. Blanchard, acting roadmaster of the Atchison, Topeka & Santa Fe, has been appointed roadmaster, with office at Newton, Kan. Mr. L. Bradley, who has been on a leave of absence, has been appointed roadmaster of the M. & M. and Little River districts, succeeding Mr. F. Powers, acting roadmaster, assigned to other duties. The headquarters of Roadmaster William Eglinton have been moved from Arkansas City, Kan., to Mulvane.

The office of Mr. W. H. Eliott, signal engineer of the New York Central & Hudson River, has been moved from New York to Albany, N. Y.

Mr. A. Shields, master mechanic of the Canadian Northern, has been appointed also master mechanic of the Duluth, Rainy Lake & Winnipeg.

Mr. H. McConkey, superintendent of telegraph maintenance of the Canadian Northern, has been appointed also superintendent of telegraph maintenance of the Duluth, Rainy Lake & Winnipeg.

Mr. J. G. Hopkins has been appointed assistant supervisor of Division 10½ of the Western Pennsylvania division of the Pittsburg divison of the Pennsylvania, succeeding Mr. H. R. Catlin, promoted.

Mr. J. C. Meredith, engineer of the Florida East Coast Ry., died at Miami, Fla., on April 20.

Mr. R. G. Kenly, formerly engineer of maintenance of way, Lehigh Valley, has been appointed chief engineer of Minneapolis & St. Louis and the Iowa Central.

Mr. S. B. Clement, assistant chief engineer of the Temiskaming & Northern Ontario, has been appointed chief engineer, with headquarters at North Bay, Ont. Mr. Clement succeeds Mr. G. A. McCarthy, who has resigned to enter private business.

Mr. T. H. Croswell has been appointed chief engineer of the Spokane, Portland & Seattle, with headquarters at Portland, Ore. Mr. Croswell was at one time chief assistant engineer of the Northern Pacific at Spokane.

Mr. J. V. Nubert, division engineer of the New York Central & Hudson River at Syracuse, N. Y., has been appointed chief engineer of the maintenance department at New York. Mr. W. Murray, roadmaster at Canandaigua, has been appointed to succeed Mr. Nubert and Mr. McGarvey, assistant roadmaster at Rochester, will succeed Mr. Murray.

Mr. A. B. Vaughan, mechanical foreman of the Lexington, Ky., shops of the Louisville & Nashville, has retired after 50 years of continuous service with the company. He is the second oldest employee connected with the system. Mr. W. B. Blue, engine inspector, will succeed Mr. Vaughan.

Mr. James Bleasdale, of Wilmerding, foreman of department D, of the Westinghouse Air Brake Co., has resigned to accept a position with the motive power department of the Baltimore & Ohio.

Mr. J. A. Shannahan, formerly supervisor of bridges and buildings for the San Pedro, Los Angeles & Salt Lake, has been appointed division engineer in charge of the new shops, roundhouse and other railroad buildings to be erected at Las Vegas, Nev.

Mr. J. M. Meade, engineer of the Eastern Grand division of the Atchison, Topeka & Santa Fe, has been

appointed Engineer Eastern Lines, with office at Topeka, Kan. Mr. F. M. Bisbee, engineer of the Western Grand division, has been appointed Engineer Western Lines, with office at La Junta, Colo. The office of engineer of the Central Grand division at Newton, Kan., held by Mr. W. H. Earl, has been abolished. These changes are made on account of the recent division of the Santa Fe into two territories.

The Minneapolis, St. Paul & Sault Ste Marie, having leased the Wisconsin Central, will hereafter operate that road as a part of its system, to be known as the Chicago division. The following is a list of the engineering officers: General Mechanical Superintendent, Mr. Theodore A. Foque, formerly mechanical superintendent of the Soo Line; Mechanical Superintendent, Chicago division, with office at Fond du Lac, Wis., Mr. A. R. Kipp formerly superintendent of motive power and cars of the Wisconsin Central; Chief Engineer, Mr. Thomas Greene

Locomotive and Car Shops, Spirit Lake, Idaho

Idaho & Washington Northern Railroad

So much consideration has been devoted in the past to the very large locomotive shops, that the subject of arrangement and equipment of terminal facilities in smaller units has been rather neglected. A good example of the latter type of shop is found at Spirit Lake, Idaho, on the Idaho & Washington R. R. Here, the modern practice of compact arrangement, with room for extension, crane service for erecting and machine shops, facilities for stripping and erecting the heaviest locomotives and convenience in handling material have been carried out with such modifications as are demanded by the reduced size of the plant.

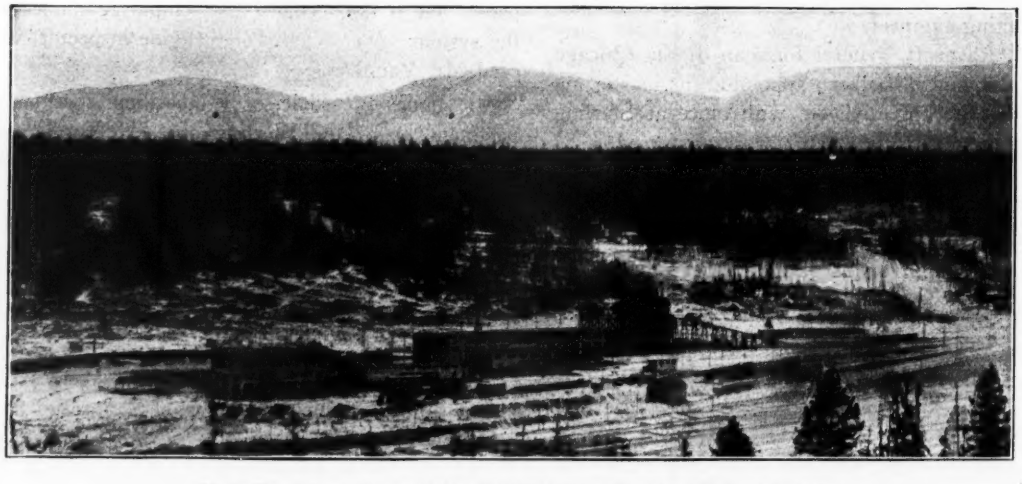
These shops are planned to handle all repairs to the equipment of the railroad not only as at present constructed but also for the extensions now being made.

In the general arrangement of buildings the roundhouse and the facilities for turning engines naturally took precedence; and, as the shops are placed between the main line of the railroad and a hillside, the location of the main buildings on one side of a straight lead to the roundhouse was decided to be the most advantageous.

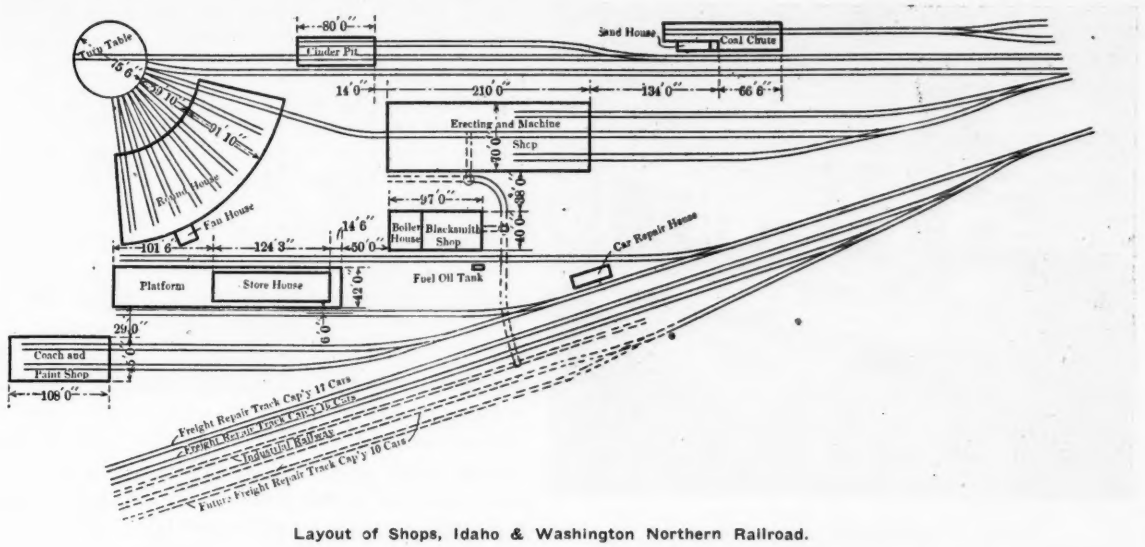
The roundhouse has a clear depth of 90 ft. inside of the walls. It has, at present, 9 stalls, and is located so as to allow extension to the full circle of 44. The outer wall is of brick resting on a concrete foundation, and the roof is of wooden construction resting on posts. The windows are set at the rather unusual height of 5 ft. above the floor and are carried up to the roof, making the outer wall in effect, a series of brick pilasters with a glass filling. By the installation of an additional 100 sq. ft. of glass per stall, over the doors along the inner wall of the roundhouse, the natural lighting over the whole house is made exceptionally uniform; and affords a pleasing contrast to the condition, so often occurring in roundhouses, where torch light at midday is a necessity for any work back of the cylinders of the locomotives.

A concrete floor, slightly sloped to drain into concrete engine pits, permits the house to be kept clean with a minimum of expense, and obviates the enormous amount of labor often expended in trucking heavy pieces to and from engines over a cinder or dirt floor. Work benches containing lockers are provided between the stalls at the outer row of posts, giving a clear passage way around the house along the outer wall. The usual drop pits for drivers and truck wheels are provided, and are fitted respectively with hydraulic and pneumatic drop pit jacks.

The roundhouse is equipped with a most complete system of protection against the consequences of runaway or carelessly handled engines. At the end of each roundhouse track, near the outer roundhouse wall, is a depressed stop to prevent engines from over-running the track and knocking out part of the house. By keeping the stop at rail level, injury to the pilot is avoided when a locomotive over-runs the rail. At a distance of 20 ft. from the turntable end of each roundhouse track is a derail, automatically operated by the turntable lock. Unless the lock, which is thrown by a lever at the side of the turntable, is in place and the turntable is in line with the track the derail prevents a locomotive from coming within



Bird's-Eye View of the Idaho & Washington Northern Railroad Shops.



Layout of Shops, Idaho & Washington Northern Railroad.

20 ft. of the turntable pit. On the lead tracks from the main line to the turntable this distance is increased to 50 ft. Anyone who has had the experience of getting a large engine out of a turntable pit can appreciate the value of this device.

Provision for handling heavy pieces and driving wheels direct from the roundhouse to the machine shop is made by extending one of the roundhouse tracks through the outer wall and connecting it to the track which runs through the machine shop. This is, unfortunately, a feature which is often omitted in shop arrangements. The fan and radiators for the indirect heating system are located in a small building adjoining the outer walls of the roundhouse, and the hot air is delivered through underground ducts into the engine pits.

On the approach tracks to the roundhouse is a coal trestle with ten 5-ton pockets, filled, by gravity, from a storage space above them. It is equipped with a motor-driven hoist for pulling loaded cars up the 19 per cent incline and has a total capacity of about 175 tons of coal. At one end of the coal trestle is the sand-house and green sand bin. The sand is dried in a sand stove and then raised by compressed air into an elevated dry-sand bin having a capacity for 10 cu. yds. of dry sand. The dry sand is delivered to the locomotives by gravity.

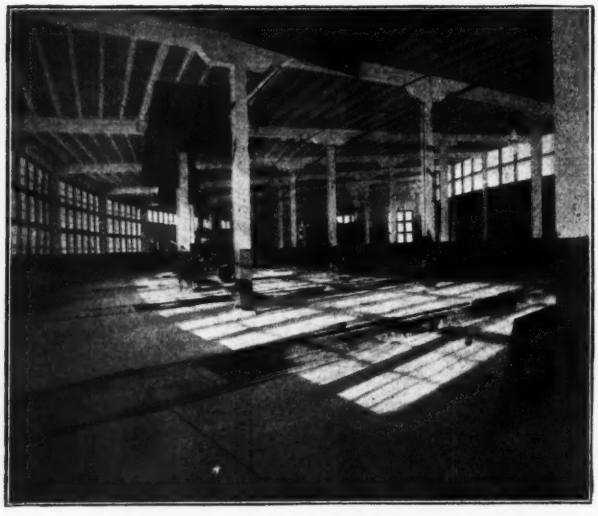
Between the trestle and the roundhouse are located the 10-in. water crane, the cinder pit and the depressed track for loading cinders. The depressed track is constructed with concrete retaining walls, of which one is widened out into a shelf between the cinder pit and the depressed track, at the level of the cinder pit bottom. This furnishes a walk 4 ft. 3 ins. wide, for the men engaged in loading cinders or cleaning ash-pans, and obviates the necessity for a deep cinder pit or for men going underneath the engines. For a cinder pit where the loading is done by hand, this materially facilitates loading. The rail between the walk and the cinder pit is carried on I-beams, supported at intervals of 7 ft. 5 ins. by concrete piers.

MACHINE AND ERECTING SHOP.

West of the roundhouse approach tracks is the erecting and machine shop. This is a brick building 210x70 ft. with concrete foundations, wooden roof trusses and concrete floor. The entire area of the building is served by a 10-ton, 3-motor, traveling electric crane, arranged so that it can be operated either from the cage, or by pendant cords extending to the floor.

The erecting shop in the south end of the building has three longitudinal erecting pits, all served by one transverse drop pit with a 30-ton hydro-pneumatic transfer jack. When a locomotive enters the shop for overhauling, the engine truck springs are blocked and the front pair of drivers are dropped, moved out between the pits, and taken away by the traveling crane. The engine is then moved forward so that each pair of drivers may be removed in succession, the last pair being removed after the rear end of the engine has been securely blocked. The engine truck may be removed by jacking up and blocking the front end; or dropping it as it passes over the drop pit, and supporting the front end of the engine on a special track under the cylinders. This method of de-wheeling an engine takes little time and labor, and does away with the dangerous and laborious jacking necessitated in wheeling and de-wheeling heavy modern locomotives where drop pits or tables are not used. It also does away with the necessity for the moving about of partially stripped engines incident to the use of gallows frame or drop table in combination with a transfer table, and permits all the stripping to be done over the same pit on which the engine is erected. As the shop was designed to serve an equipment of approximately 50 engines, the first cost of traveling electric cranes with capacity for the heaviest modern locomotives, or the combination of a drop table and transfer table, would have been prohibitive.

The machine tools are located in the north end of this building and are arranged so that the small tools, driven by countershafts, are grouped along the east wall. The motor-driven tools are a 48-in. planer, 36-in. lathe, 51-in.



Interior of Roundhouse, I. & W. N. R. R.

boring mill, 60-in. half universal radial drill press, 79-in. driving wheel lathe with double wheel quartering attachments, and 400-ton hydraulic driving wheel press. The latter is set in a covered pit of such a depth that the ram stands above the floor at a height suitable for pressing on and off of car and truck wheels. By removing the pit cover, driving wheels may be handled in the press. The boring mill, which has a chuck on the table and is used for boring car wheels as well as for general work, is equipped with a jib crane and air hoist for handling work from the floor to the table.

The small tools, which are driven from a line shaft hung from the east wall of the building, consist of an 18-in. lathe, 24-in. shaper with concave attachment for slotting driving boxes and with index centers, 2-in. bolt cutter with lead screw for cutting staybolts, water tool grinder, double dry grinder, twist drill grinder, power hack saw, ¾-in. high speed drill press and 4-in. pipe machine. The countershafts for these machines are supported by timbers carried on brackets on the east wall and are located so as to minimize the obstruction of light from the windows. A band saw and a single spindle wood borer have also been installed and are both driven by a single motor set on the floor.

In the northeast corner of the machine shop is located the tool room enclosure. In part of this space, separated from the tool room proper by a railing, is installed a motor-driven, two-stage air compressor, of 500 cu. ft. capacity; and also the switchboard and a motor-generator set which supplies direct current for the variable speed motors driving machine tools and for the crane motors. The power for the shops is supplied by 3-phase, 440-volt, electric current, from an outside source; and to this fact is due the rather unusual location of the machinery. Since the operation of the air compressor is made automatic by means of an unloading device, and the motor generator set requires practically no attention, the services of an engineer are dispensed with, and the machinery is watched and cared for from the tool room.

In the opposite corner of the north end of the building are located the radiators and the fan for the indirect heating system; and over these, on an enclosed platform 10 ft. above the floor, are the toilets and lavatories, and the metal lockers for the shop employes.

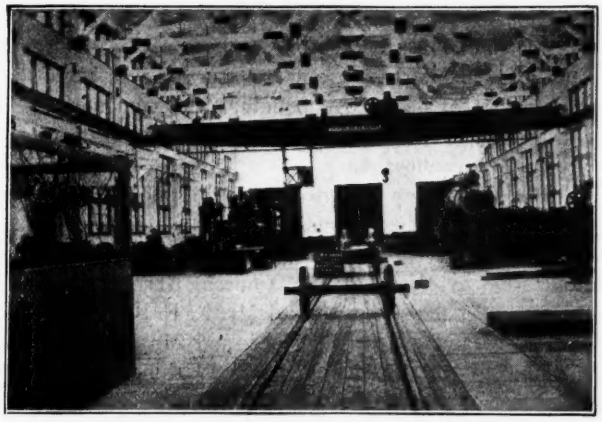
BLACKSMITH SHOP.

The blacksmith shop ocupies 65 ft. of the south end of a brick building parallel to and 38 ft. west of the machine shop. The building is 97 ft. long by 40 ft. wide and has brick walls on concrete footings and a trussed wooden roof. The blacksmith shop equipment consists of one 1100-lb. steam hammer, a single-ended motor-driven punch or shear, and three forges, one of them extra large. Space for additional forges and anvils is provided. A 3-ton jib crane serves the hammer, the punch, and the large forge. Blast is furnished by a motor-driven pressure blower set in a covered pit and discharging into underground tile ducts. One corner of the building is used as a flue shop. It is equipped with a motor-driven flue cutter, an oil flue welding furnace, and a pneumatic flue welder. Space outside of the building has been provided for a flue rattler.

BOILER PLANT.

Since electric power for the shops is furnished from an outside source, and electric drives are installed throughout, there is no necessity for a power house. However, a steam boiler plant is installed for supplying steam for heating the various buildings and the coaches in the coach yard, for operating the steam hammer, and for blowing fires in the roundhouse. The boiler room occupies 32 ft. of the north end of the same building as the blacksmith shop and is separated from the latter by a brick wall. This location places the boilers approximately in the center of the group of shop buildings. The boiler plant consists of two 125-h. p. horizontal return tubular boilers which burn either coal or refuse slab wood. The firing floor is covered with brick; and a coal bin with a capacity for one carload of coal is placed inside of the west wall of the room opposite the boilers, and is filled direct from cars standing on a track alongside of the building. All condensation from the heating systems, and the cooling water from the air compressor jacket, is drained into a concrete pump in the boiler room and returned to the boilers by an automatic feed pump and receiver which may also be supplied with city water. An

Interior of Paint Shop, I. & W. N. R. R.



Interior View, Machine and Erecting Shop, I. & W. N. R. R.

injector has been installed for feeding the boilers in case of an emergency.

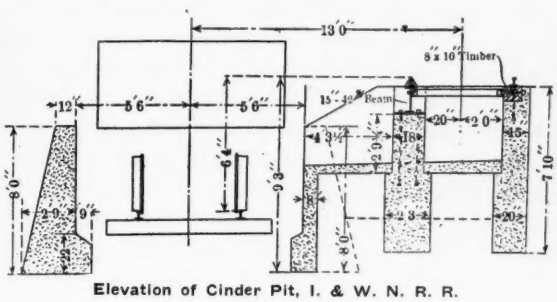
STOREHOUSE AND OFFICE BUILDING.

The storehouse is a brick building 124x30 ft. with a wooden floor resting on concrete foundations, and a wooden roof. In the south end of the building are the offices of the mechanical department, and, at the north end, is a fireproof oil cellar. The metal oil tanks in this cellar are filled from the level of the storeroom floor, and the oil is distributed from a delivery counter, to the level of which the various kinds of oil are lifted by self-measuring pumps.

PAINT AND COACH SHOP.

The storehouse platform extends all around the building at the same level as the storehouse floor; or at the height of the average car door. At the north end of the building the platform is extended out 100 ft. from the building wall with the full width of 42 ft.

This building is intended for general use in repairing, cleaning and painting passenger cars. It is 108 ft. long and 45 ft. wide with two longitudinal tracks extending nearly the whole length of the building. The walls are of brick, resting on concrete foundations, and the roof is of wood and has longitudinal skylights extending along the center line to give ample light between the tracks. The floor is of concrete and is sloped in accordance with an underground system of drains in order to premit washing of coach bodies and trucks. Along the walls at the north end are sinks for washing the removable parts and the drying racks for sashes, doors, ventilators and seat arms. Trussed planks resting an ladder horses are provided for painting or repairing coach sides.



Elevation of Cinder Pit, I. & W. N. R. R.

COACH AND FREIGHT CAR YARD.

Owing to the ordinarily mild climate at Spirit Lake, the freight car repairs are made outside on tracks west of the blacksmith shop. A car repairman's house, 40 ft. by 12 ft. is located alongside of the repair tracks, for housing tools and clothes. A line of piping for compressed air is run along the tracks with hose connections for compressed air drills and hammers. The coach yard has two tracks between which are service boxes at intervals of 50 ft., containing steam, water and air connections. Standard gauge industrial tracks are provided, for handling mounted wheels and transporting heavy material between the machine shop and repair tracks and the blacksmith shop.

HEATING AND LIGHTING.

The machine shop and roundhouse are heated by indirect heating systems. One 120-in. fan in the machine shop and one 130-in. fan in the roundhouse, deliver hot air through underground concrete and tile pipe ducts. The fans are motor driven. The storehouse and office building, the car repairman's house, and the coach and paint shop, are heated by direct radiation from steam coils. As the amount of exhaust steam from the shops is negligible, live steam is taken from the high pressure steam mains, through reducing valves, for use in the heating coils.

The shop yards are lighted by a number of arc lamps, supported either on the buildings or on lighting poles distributed about the yard. The machine shop and the blacksmith shop are lighted by arc lights. The natural lighting of the former shop was made a matter of special attention and the result due to the arrangement of windows and the absence of overhead obstructions is an endorsement of the design. The other buildings, including the roundhouse, are lighted by incandescent lights; and, in all buildings, a number of outlet boxes for extension lamp cords are provided in addition to the stationary lights.

WATER SERVICE AND SEWERS.

The high cost of cast iron pipe in this locality made the

View of Cinder Pit, I. & W. N. R. R.

use of iron water mains undesirable; and, as the soil at the shops is a dry gravel, wooden water pipe was installed throughout the shop yards. Fire hydrants are arranged about the yard; and, in addition, two hose houses, each containing a hose reel on a truck and a supply of fire hose have been provided. In the interior of each building hose valves and reels of fire hose have been provided so that fires originating inside of the buildings may be properly attacked.

Owing to the fact that seepage through the soil is very rapid, the roundhouse, turntable and cinder pit drain into a dump pit. The sanitary sewers from the machine shop and storehouse are connected through a manhole to a city sewer running near the shops.

CONSTRUCTION.

The preliminary work for the plans of the shops was taken up in May, 1908, and construction was begun the latter part of June. All buildings and equipment were turned over to the Railroad company, ready for operation, early in November, 1908.

The shops were designed and built, and all the equipment was furnished and installed, including even all hand tools necessary to make the shops complete and ready for operation by Westinghouse, Church, Kerr & Co., engineers under the supervision of Mr. R. F. Blackwell, vice-president and general manager, and Mr. W. C. Smith, chief engineer of the Idaho & Washington Northern Railroad.

The Maintenance of Way Department

Concerning Rail Orders

Editor, RAILWAY ENGINEERING:

We will admit for the sake of furthering the argument that the roadmaster has been advised by his superior that he would be furnished with all the new rail he had asked for and that in addition a few extra miles had been ordered for him, his estimate being considered too conservative (only 60 miles). Another letter has advised him to put on all the help he needed and to pay whatever price he finds necessary to secure the best.

The rolling mill has advised that the first lot will be rolled the first of next week and all that remains to be done is to unload and lay it. The mill will, of course, load it on flats which will come all in one lot with a car each of splices, spikes and bolts coupled in next to the rails.

The superintendent has agreed to furnish a picked train crew for a work train running them around several others for their work. The mechanical department will furnish one of their very best engines as soon as it is learned that she is to be assigned to work train. Who would like to be the roadmaster? But wait; the alarm clock has just announced the fact that another day is here and that facts, not fanciful dreams, are in order. What has become of those twenty cars of rail rolled last week? A hurried glance through a big bunch of papers starting with his original estimate of 22 miles and continuing through four revisions which finally result in a concession of five and one-half miles, shows him that five cars have straggled into the yard in the last six days. A glance over the contents of the various trains west bound shows him there are two more coming on 67 and one in the local. The daily inquiry of "What can you find out about my rail?" is put to the car distributor, chief dispatcher and superintendent, each in his turn, and elicits the information that two have been set out at Ja and three at Fy, account bad order, and the balance are still unaccounted for. The work train ordered for that day has been canceled late the night before, on assurance that there would be no rail in, during the night, leaving the roadmaster free to go out for another day's fishing of which he is so fond.

Who would dare deny the fact that the roadmaster's lot is a happy one? What's this? A message from the car accountant through the chief engineer asking why so many cars are being held loaded with rail, big gondolas being in demand for lake sand and coal shipments, and car service piling up.

Explanations are not in order and so in the hope that the cars now on the road may reach their destination, and with a silent prayer that the local will be handled carefully so that the rails will not be shifted and bad ordered by some eagle-eyed inspector, a work train is ordered for 5 a. m. the next day. Section men at various points are instructed to be on hand promptly for the third time, and our friend, the roadmaster, is wondering what he will find to do all day tomorrow. He finally decides to go out with the train and is up at 4 a. m. and down to the yard. He is informed on arrival at the yard office that the train crew had just been called and that instead of a regular and experienced crew he would get an extra conductor, recently promoted, and one new brakeman. A grimy-faced, sleepy-eyed roundhouse man informs him that the 5211 which has been standing around for two weeks, has been fixed up and ought to be ready in an hour or so. Finally, about 6:30, every means of further delaying the train having been exhausted, including switching the cars out of four different trains, the start is made.

Section men to the number of 20 have been picked up, each gang being instructed as it boards the train. Each man wears a suit as he anticipates his hard day's work of 9 hours which will net him $1.21. An encouraging word is spoken to each and occasional reference made to the big day's work done last year, and a hope expressed that even the late start may be overcome by a little extra crowding. The noise of the train is easily distinguishable above the sound of applause caused by the reference to crowding the work.

Jackson Hill, the Waterloo of many a good engineer and engine, is at hand and a noticeable checking of the speed of the train is observed by all. At last, after a few mad and long drawn out exhausts, engine 5211 lays down miserably. The blower (Heaven bless the man who invented it) is put into service and after a delay of some 12 or 15 minutes more our train is again on the move. The delay on the hill has made it necessary to go in at N. S. for No. 4, both engineer and conductor being afraid to go to the next station, as engine 5211 is leaking badly and time is too short. No. 4 is 20 minutes late and the dispatcher is afraid of paralysis, so does not put out any time, preferring to put in his time checking up the last list of changes in officers, put out by the brakeman on the extra list. At last the goal is reached, everybody discouraged and disheartened and no prospect of even a fair day's work being accomplished, let alone a record breaker, unless it be for delays. Encouragement is missing and the work drags miserably till 5:30 p. m., which is quitting time. The engineer has injured one man through rough handling of the train brought on in an effort to put the old scrap, as he calls her, entirely out of business, while the conductor, through a feeling of discontent at his poor showing with his first day of train work, has barely averted injury to some one by giving careless signals to the engineer. A poor half day's work has been accomplished at an expense representing a day's work. Who will dare say to the operating department it was their fault in not giving the train all the show possible with other trains; or to the mechanical department, it was theirs, in not furnishing a good engine, and yet it is so. How many poor days' work have resulted from just this lack of interest in these two departments. When the matter of delays in minutes is compiled, it may not look so bad but the results are much more serious than the mere figures show. Why should a work train be ordinarily held in such contempt? It has an earning power as well as any train on the road, in many instances much greater in proportion to the expense than some of the regular trains, for which they are expected to get out of the way so quickly. Why cannot these two departments be made to see this and work in a little closer touch with the track department? Some of our readers please tell me why. I am much interested and think there are others.

While this may not apply to the relaying of rails solely, it is one of the items of cost and will materially effect the general expense chargeable to you. This is the next in order after the nerve racking, head-ache producing arguments with your superior as to "your actual needs for the year" and after you have been almost convinced that you do not need any for 10 years to come, leaving nothing for you to do but convince your foremen that such is really the case.

Yours truly,

Ohio. Roadmaster.

Gauging Track

Editor, RAILWAY ENGINEERING:

It is important that track be kept to as near gauge at all times as possible. We have our section gangs gauge as much of their track as they can during the winter months, weather permitting, so that when tie renewals are being made in the spring months, the new ties can be put to accurate gauge, without taking up too much of the trackman's time during the busy season.

Track gauge to be placed at right angles to the track, shorter prongs of the gauge must be placed at the joints in track, laid broken jointed.

When spikes are drawn, the spike holes are to be plugged by wooden plugs, which are furnished for that purpose.

When track is found out of gauge it may be due to the fact that the rail has worn the tie so that the bearing of the rail is not parallel to the face of the tie. This is particularly liable to be the case on curves, and it is frequently the inner rail of the curve which has worn a tie unequally under the two edges of the rail.

When ties are cut in such a way as to materially change the gauge of the track under the passage of a train, new bearings, which will hold the rail at right angles to the tie, are to be adzed.

Flange wear on the outer rail of a curve will also widen the gauge. The track is not to be altered to restore gauge for this cause alone. Spikes must be driven square to the top surface of the ties. The last blow which brings the head of the spike to the rail must be given lightly so as not to injure the spike head. All defective neck-worn spikes are to be replaced by new ones.

Spikes on inner side of each rail must be opposite and spikes on the outer side of each rail must be opposite and staggered at least three inches from the position of the inner spikes, excepting at joints where angle plates are used.

We use the usual track gauging tools such as clawbars, adze, spike maul, bar for pressing the rail into gauge, stub punch, and gauges.

Yours truly,

Michigan. Roadmaster.

Gauging Track

Editor, RAILWAY ENGINEERING:

Gauging track is as important as surfacing and lining track, as you are unable to furnish complete line on track without a perfect gauge. I will also say where track is badly out of gauge such track should be gauged before lining, for it is almost impossible to line such track straight, as there is a strain on such track which does not allow it to stay in line where track is slightly out of gauge. Such track may be put in line first and then gauged.

We have what we call tie line, said side should be

used when setting in lining so that when you gauge your track will not interfere with the adjustment of your ties. Where spikes are interfering to bring track to gauge, such spikes should be pulled out of tie and should not be bent back from rail as a bent spike will not give the service in holding the rail as a good straight spike. By bending spike back it will also enlarge the hole and move easily to work loose. Therefore, my method is to pull such spikes and drive a plug in the hole so as not to permit the water to stand in same hole as it will cause tie to decay. Then set spike, but set it plumb. Spike may be set in same place after hole is plugged if uniformity demands it, but care should be taken in driving down the spike as to the ease of the blow when head of spike is about to touch the flange of the rail to prevent spike from cracking or breaking.

As to frequency of gauging it depends upon the condition of track. As rough track is very much the cause of track getting out of gauge my method is to gauge it in the spring after the track has stood the abuse of the winter months. In doing so you should also drive down all spikes that are sticking up from rail.

Yours truly,

Ohio. Roadmaster.

Rail Joints

Editor, RAILWAY ENGINEERING:

From the many different kinds and makes of rail joints I have had experience with, I prefer the Weber or Continuous joint with a preference for a Weber joint for the following reasons: The length of joint is 22 or 24 inches and the joint consists of a sole and channel plate and wood filler making a good rigid joint and still permitting the expansion and contraction of the steel. The wood filler overcomes to a great extent the sound of the passing wheels over the joint and the rattle of occasional loose bolts. I also prefer a 22 or 24 inch joint fastening supported by two joint ties spaced 10 ins. apart to the 6-hole, 36 or 38 in. anglebar with three ties. To my mind this joint is too rigid to permit of expansion causing track to buckle out of line badly in the summer season especially in the west, where we have a great amount of heat. I have never had any trouble from expansion of steel where the Weber joint was in service and more or less with other joints especially on heavy grades. I would be pleased to hear from others.

Yours truly,

California. Roadmaster.

Rail Joints

Editor, RAILWAY ENGINEERING:

I have been working in the roadway department for the last 27 years and I have made rail joints one of my most important studies as the joint is the weakest point. I have watched it very closely. I have several types of joints on my district, namely, as follows:

The plain angle bar, 36 ins. long, with 6 holes.
The plain angle bar, 24 ins. long, with 4 holes.
The 100 per cent joint, 24 ins. long, with 4 holes.
The Wolhaupter joint, 24 ins. long, with 4 holes.
The Weber rail joint, 24 ins. long, with 4 holes.

The Weber rail joint is by far the best joint of them all for many reasons; first, it is the longest life joint and the rail stands up longer with this joint than any other; then the first weakness the joint shows is in the wood filler and for a very little cost you can put in a new filler, making the joint almost as good as new; then the next best feature, the expansion acts better in the Weber than any other joint that I have ever used, and of course you do not need any nut locks with the Weber rail joints.

Yours truly,

Tennessee. Roadmaster.

Rail Joints

Editor, RAILWAY ENGINEERING:

I think a great deal of the Weber joint which some of the trunk lines are using. While I have not had a very wide experience with this joint I think it is the best joint especially under heavy traffic.

In relaying track with rail of 75 lbs. and over on old settled road beds, I think it should be laid with broken joints and care should be taken to get the joint as near the center of the opposite rail as possible. By doing this it will be very little trouble to keep the joint ties in the proper place. When laid with even joints I find it a very difficult matter to keep the joint ties in place, on account of the rail creeping. This also keeps the roadbed more or less open at the joint, making it hard to keep up in wet weather.

As to rail joints: It has been my experience that the 20-in. 4-hole joint gives better satisfaction than the 40-in. 6-hole. This division has three miles of the 40-in. joints, and I must say that it is a more difficult matter to keep up this three miles than all the rest of the division. I am also in favor of the expanded joint, picking the best ties for the purpose.

We use the Verona nut lock entirely and find them perfectly satisfactory. Our track has only been in operation for two years and I cannot give you any information as to the life of the joints and its effect on the rail.

Yours very truly,

Louisiana. Roadmaster.

Drainage of Track

Editor, RAILWAY ENGINEERING:

On ditching railway roadbeds, the surroundings of every locality are so different that no one rule holds. Good common sense judgment and observation will have to be brought into use to make a success of anything. Here in Southern California we do all our ditching in the fall of the year before the rain sets in, as all the vegetation from the summer growth collects and drifts to ditches and drains, and chokes them up or washes them out. Of course in the east where it

rains any time, you have to be prepared for drainage all the time.

Referring to ballasting track, my experience has been that nothing less than 6 ins. of ballast would give results that would pay. Two grades of ballast is better 3 in. or 4 in. rock for the base and gravel on top for surfacing. This gives the best results as the water percolates through coarse rock much better than fine, draining the roadbed and thereby prolonging the life of the tie. Sand makes the best roadbed of anything, all points considered if you can retain it by riprapping the embankments with rock. It is easy on the rolling stock as it makes an elastic roadbed. Water has no effect on it, consequently it requires no drainage.

Referring to slope on ditching, my experience has been that 4 ins. to the foot drains thoroughly and allows the sun and wind to dry the roadbed and requires no bleeding of the ties as with a flat slope. Every roadbed should have about 4 ft. of shoulder from end of ties, making it 16 ft. wide at top of fill, as a narrow fill causes ties to become center bound on account of the embankment settling at the outsides.

Yours truly,

California. Roadmaster.

Drainage of Track

Editor, RAILWAY ENGINEERING:

Good drainage is requisite to good track, and the farther and sooner water can be diverted from track the more stable will become the road-bed. Ditches at all times should be maintained in good condition, but during the fall particularly, special attention should be given to them. Where old ditches exist, and the slopes have become sodded, the ditches should be cleaned at the bottom, care being taken not to break the sod on the slopes, as it would cause more material than otherwise to wash into the ditches, obstructing the flow of water and possibly damaging the roadbed. As a rule ditches should be dug parallel to the roadbed, and not less than six and one-half feet from the gauge line of the outside rail to the inside ditch line, and should have a slope of one and one-half to one and be of such capacity as to convey the water from the roadbed, side slopes and other unavoidable transverse drainage and the maximum flow of the water in ditches should remain below the sub-grade.

In cuts where the road-bed is none too wide and the cost of widening the cuts is excessive, and it is impracticable to make ditches of such depth and slope as is required to drain the road-bed properly, it is very frequently found necessary to deepen the ditch, lay a line of ordinary drain tile and then re-fill the trench with porous material, preferably cobble stone, or even filling in these trenches with cinders without the tile, have proven successful, and the latter method is very inexpensive. Where soft track has developed in cuts it is not only necessary to deepen the parallel ditches, but transverse trenches must be dug from the bottom of parallel ditch to the lowest point of the water pockets; farm tile should then be laid from the end of cross ties to the parallel line of tile, and care being taken to fill the space from end of farm tile to center of track with porous material; this drains the water from the pockets and in the course of a month or so the soft track will disappear. Where the volume of water to care for is not too great, the parallel ditches and the transverse ditches can be dug, the material taken therefrom disposed of and the ditches re-filled with cinders.

At the ends of long cuts where the accumulation of water is of such quantity as to do serious damage to the road-bed, the ditches should diverge from the road bed, and it is frequently necessary to pave the slope of the ditch nearest to the road-bed; and where high embankments exist, it is often found advantageous to convey the water from the track ditch to the level below through a line of drain tile, the greatly increased grade of the tile and the consequent increased velocity of the water as compared with the velocity of the water in the upper ditches makes it possible for such lines of tile to take the water of an open ditch of much greater cross-sectional area. Riprapping the embankment is also a method of evading the erosive action of the water on the embankment in descending to the level below, but this method is expensive even where the stone is placed at random, and is not always successful unless the stones are carefully placed or the water course paved. paved.

Yours truly,

New York. Roadmaster.

Rail Joints

Editor, RAILWAY ENGINEERING:

I will make a few remarks as to my experience in regard to rail joints and fastenings, from the (old straight-fish plate type), of which I am sorry to say that there are too many of them still in use on some roads.

As I have to do with a narrow gauge road at present, viz., 3 ft. 6 in. gauge (although I have had considerable experience on standard gauge roads) the rails we use are mostly 56 lbs. and 67 lbs. to the yard, and coming down to the joint question I may say, to my mind, the best joint splice bars are the continuous joint, angle plate with spike slots about 3 ins. from each end, which gives a good suspended joint with space enough between the two joint ties to enable men to properly tamp ballast from both sides of tie.

I prefer this joint because it supports the base of the rail and also answers for a tie plate. I prefer the suspended joint to the solid one centering on tie because it prevents the flattening or brooming of the rail ends (on account of having a certain amount of elasticity) by the pounding of the passing wheels.

In order to have a good joint with any kind of fastening, it is very important that joint ties should be properly tamped and should have more attention in this regard than any other part of the rail. My custom is, when lifting and surfacing track, to use a 15-

lb. wooden maul to pound down the joint ties, and allow the rest of the ties to go with the ordinary tamping. The length of rail joint in my opinion for a 67 lb. rail should be 24 ins. and proportionately according to weight of rail. This length gives a space of about 10 to 12 ins. between joint ties for tamping purposes.

We use the positive nut lock washer, and I like it better than anything I have seen yet. It is easily put on and holds nut always tight if looked after from time to time, and prevents the noisy rattle of the joint.

Yours truly,

Canada. Roadmaster.

(M. of W. Dept. Continued on Page 104.)

Government's Forest Laboratory

The government's new forest products' laboratory will be located at the University of Wisconsin, at Madison. In naming Wisconsin, Gifford Pinchot, Chief of the United States Forest Service, said: "I have had few decisions to make which were so difficult or which have had such prolonged and careful consideration as the decision as to which of the offers for co-operation in establishing and maintaining a forest products' laboratory I should recommend for acceptance by the Secretary of Agriculture."

The establishment of the laboratory means the concentration of all lines of the experimental investigations of the government looking to closer and better utilization of timber and the checking of wood waste. Forest Service laboratories for timber test work at Yale and Purdue Universities and the government's wood pulp and wood chemistry laboratory in Washington will be consolidated and transferred to Madison as soon as practicable. A force of fifteen to twenty timber test engineers, experts in wood preservation, wood pulp manufacture and wood distillation will have charge of the work carried on. The laboratory will have an equipment valued at not less than $15,000. The University will furnish the building, light, heat and power, and in return advanced students will have the use of the laboratory for special work in related lines.

In announcing the decision to the presidents of the Universities which made offers, Chief Forester Pinchot said: "After the generous propositions of the various institutions which were made were all received and considered, those of the Universities of Michigan, Minnesota and Wisconsin were seen to be most advantageous. These three were studied and compared in every useful way we could devise, and at last it was seen that all things considered, the proposition of the University of Wisconsin should be accepted.

"The propositions of the three universities as to buildings were substantially equal. In other directions also there was little to choose, while in still others the differences were marked. It would serve no good purpose to set forth the specific details upon which the choice rests. On the contrary such a course might lead to unfortunate discussion of relative merits leading to no conclusion. I have, therefore, preferred simply to add that among the factors considered, the following were necessarily given special weight:

"1. Building, site, and equipment of light, heat, and power;

"2. Courses in instruction in forestry, agriculture, engineering, and science generally;

"3. General accessibility to the forest regions of the East, Central Valley and South, to the industries most concerned with the work of the laboratory and to the officers of the Forest Service on inspection;

"4. Practical research work, especially that done in connection with professional and industrial organizations;

"5. Relation to State and Federal policies affecting the conservation of natural resources.

"The laboratory could only go to one of the three universities. Two must be disappointed. For that disappointment I am keenly sorry, but nothing I can do will prevent it. I ask you to accept my heartiest thanks for the generous interest of your university, its president and board of regents, your delegation in congress, and the legislature and people of your state in the advancement of forestry. I congratulate you on the magnificent support you have had, and I am heartily sorry that I cannot recommend in favor of all three."

Adequate Tie Supply

That the humble railroad tie is a most important factor in the material development of the country is a great truth that is little understood by people outside of railroad circles. The puffing engine that speeds at the rate of a mile or more a minute over the country is a slave to the two steel rails that insure a smooth and safe road, and these rails in turn depend on the old-fashioned wooden cross-tie which holds them in place.

Yankee invention has not yet found a substitute which has induced the railroads to give up wood, although experts say that the day will surely come when the country's forests will no longer be called upon to supply the demand for ties. Up to the present time it seems that no other material has been found which has the resiliency of wood and which at the same time causes less wear and tear on the rails, fastenings, and roadbed.

The country's railroads during the last two or three years used 110,000,000 to 150,000,000 of sawed and hewn ties a year. The ideal tie timber is white oak, which combines the qualities of durability, hardness, strength, and close grain. It is not only excellent for ties, but is widely used in ship building, for general construction, in cooperage, in the manufacture of carriages, for agricultural implements, interior finish of houses, and for furniture. On account of this wide use, the supply has been greatly reduced and some of the railroads have been forced to pay almost prohibitive prices for ties, or to substitute other and cheaper

woods to replace the white oak ties rapidly disappearing from their lines.

Over 40 per cent of the ties recently purchased by the railroads of the country are oak, according to latest statistics of United States Forest Service. Cross-ties of Southern pine formed somewhat less than 25 per cent. Douglas fir ties ranked third, with approximately 10 per cent of the total. Naturally the proportion of these two timbers will increase as the supply of oak dwindles. This is also true of cedar, chestnut, cypress, Western pine, tamarack, hemlock, and other trees which are coming into the market as tie timbers.

Cedar, which is very durable, has been extensively used to take the place of white oak for ties, but it is so soft that it is readily cut by the rails. This necessitates the use of tie plates and other protective devices when cedar ties are used. As the supply of cedar is also running short, it is necessary for the railroads to seek further for new tie timber. One of the woods which has all the requisites of a good tie, with the exception of durability, is the beech.

A beech tie generally consists largely of sapwood, which partly accounts for its lack of durability, but, on the other hand, allows a thorough and easy preservative treatment. In Germany and France, beech ties have been successfully preserved from decay, and are used very extensively. Beech is found widely distributed throughout the eastern part of the United States, and at the present time is comparatively cheap and abundant. If, therefore, the railroads whose lines are located in the regions where beech is abundant can make use of this wood, treated with some suitable preservative, another source of supply of tie timber will be opened up.

Stumpage values have been increasing so rapidly during the last few years that many railroads have found it necessary to modify their timber policy, and they yearly apply preservatives to a greater number of ties and to more kinds of wood. Substitute woods naturally vary with different sections of the country, but in most cases they lack the two essential qualities found in white oak, namely, resistance to mechanical wear and to decay. Experience proves that wear can be successfully retarded by the use of tie plates and other mechanical devices, and decay can be postponed by the application of proper preservatives. The new conditions have made it necessary for many railroad companies to meet the problem of preservation by establishing treating plants at central points of distribution along their lines.

General Rate of Timber Consumption

It has been estimated that the amount of wood annually consumed in the United States at the present time is twenty-three billion cubic ft., while the growth of the forest is only seven billion ft. In other words, Americans all over the country are using more than three times as much wood as the forests are producing. The figures are based upon a large number of state and local reports collected by the government and upon actual measurements.

The State Forester of Connecticut, in a recent report, has given figures on growth and use for New Haven county, which give many more valuable details than are generally to be obtained, and well illustrate how the forest is being reduced by over-cutting. In this county a very careful study was made on each township of the amount of forest, the rate of growth, and the amount of timber used. For the year 1907 the timber used was 120,000 cords, in the form of cordwood, lumber, ties, poles and piles. The annual growth on all types of forest land, including the trees standing on abandoned fields, for the year, reached a total of 70,000 cords. Thus the amount cut yearly exceeds the growth by 50,000 cords.

The amount of standing timber considered as merchantable and available for cutting within the next few years was found to be 1,200,000 cords. Each year the annual growth increases the supply on hand by 70,000 cords, while the use decreases it by 120,000. The net reduction is therefore 50,000 cords a year. If the cut and the growth remain at the present figures, the supply of merchantable timber will be exhausted in about 20 years. At the end of that time there will be a large amount of forest standing in the county, but it will be in tracts under forty years of age, containing wood below the most profitable size for cutting. Cordwood could still be cut, but supplies of the most profitable products, like ties and lumber, would be practically exhausted.

Connecticut's case illustrates what is meant when the exhaustion of the timber supply is spoken of. It does not mean that every tree will be cut and that the ground will be bare. It means, on the other hand, that year by year the people of the country are cutting more timber than the forest grows, and that within a comparatively short time the continued loss will have so reduced the forest that it will be difficult and expensive to obtain timber of useful size in sufficient quantity.

Railway Signal Association

The subjects which will come under discussion at the next meeting of the Railway Signal Association on June 8th at the Engineering Societies building, New York, are as follows:

The Semaphore Signal—Upper Left Hand Quadrant versus Upper Right Hand Quadrant, by Mr. C. H. Morrison, signal engineer, New York, New Haven & Hartford.

The Use of Alternating Current in Railway Signaling, by Mr. W. K. Howe, chief engineer, General Railway Signal Company.

The Sellers Manufacturing Company, Western Union building, Chicago, issued a new catalog on the Sellers Anchor Bottom tie plate.

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M. M. and M. C. B. Conventions

Next month, as usual, the American Railway Master Mechanics' Association will hold its annual convention on June 16, 17, and 18, and the Master Car Builders' Association on June 21, 22 and 23. At the same time, or from June 16 to 23, the Railway Supply Manufacturers' Association, of which Mr. Earl G. F. Smith is secretary, will hold an exhibition of railway appliances on Young's Million Dollar Pier.

The value of these exhibits to railroad men has never been questioned, and the supply men have always taken advantage of all the space available, which this year is 60,000 square feet. Speaking of the value of the exhibits the model of the Bettendorf all-steel box car, which has been developed in the past year, is to be exhibited this June and now this one exhibit alone will interest all car men who have discussed during the past few years the advisability of substituting the all-steel box car for the composite.

The exhibits cover all classes of mechanical equipment and it is here that heavy machinery which it is impossible to show in any other way is frequently set up and operated. All improved equipment, appliances, etc., which have been developed during the past year, are shown at this convention which you should attend if it is possible to do so.

Maintenance of Way Standards

An outline of the committee work of the American Railway Engineering and Maintenance of Way Association has recently been published. Recommendations of this association are now recognized by all railroad men, inasmuch as its membership is composed of the chief officials in the engineering department of all roads. Regarding the subjects which are mentioned below it is very probable that they will be taken up at the convention next March.

An investigation will be made of the proper thickness of ballast required to insure a satisfatcory distribution of load on roadbed. In connection with this the question of unit pressures allowable on roadbed for different materials will be considered.

A compilation of statistics on ties, both treated and untreated, will be continued and possibly conclusions will be drawn therefrom. The use, life and design of metal, composite and concrete ties will be again taken up, so as to determine more definitely their value in permanent track construction. The committee on Rail, besides continuing previous investigations, is to take up the question of rail joints and if possible recommend standard designs and specifications.

The Committee on Track was asked to recommend three lengths of switch points to meet ordinary requirements and also to recommend a minimum number of lengths of frogs, not to exceed four. This committee will also confer with the Committee on Signaling and Interlocking, in reference to the methods of treatment of track devices that come in contact with track circuits and also in regard to switch stands.

A report is to be made on the use of reinforced concrete for coaling stations and storage bins. The specifications for reinforced concrete, which were submitted at the past convention, will be reconsidered and the committee having this subject in hand will confer with committees of the American Society of Civil Engineers and American Society for Testing Materials. Typical designs of retaining walls and abutments, plain and reinforced concrete, are asked for as well as a report on the use of reinforced concrete for trestles.

The Committee on Signs, Fences and Crossings will rewrite the conclusions adopted at the past convention and report on ways and means of securing a proper quality of fence wire which will resist corrosion and give durability.

A development of a comprehensive and uniform signal system will be continued and the mechanical and electric interlocking specifications will be revised.

Typical designs of hump yards, to cover both yards where the traffic is mostly empty cars and those where it is mostly loaded cars, are to be prepared, and the question of mechanical handling of freight is to be considered. The Committee on Iron and Steel Structures is to continue the investigation of the effect of impact on bridges and also the effect of flat spots on car wheels in reference to bridges. This same committee is asked also to recommend specifications for bridge erection, and to report

on the use of reinforced concrete versus steel for the main girders of bridges carrying heavy loads under high speeds.

Grouping of different timbers for antiseptic treatment wil be continued as will also the subject of the preparation of timber for treatment. A report is to be made on the quantity and quality of antiseptics used for preservation and it is to be determined under what conditions they should be used. A report is to be made on the tests of strength of treated timber, which are to show the effect of antiseptics on the strength.

The above only covers the more important points which are suggested to the various committees for consideration. Each committee is required to consider carefully the revision of the Manual of Recommended Practice of this association and report if any changes are advisable. Each committee is given a very large amount of work to do and, though the membership of the committees is large a period of one year does not always suffice on account of the care and thoroughness that is asked of the committee.

Panama Railroad Relocation

Work on the relocation of the Panama railroad, with the exception of that on the Miraflores tunnel, is at present confined to the stretch between Gamboa and Gatun, because this is the portion of the line that must be in operation before the water in Gatun Lake is allowed to rise above an elevation of the lowest points on the operated line of the railroad between Tiger Hill cut-off, near Gatun, and Bas Obispo, the beginning of Culebra Cut. The lowest point on the relocation between Gatun and Gamboa will be temporarily at an elevation of 50 feet. There is no hurry about the stretch of nine miles between Gamboa and Paraiso as the relocation in this section runs on a berm of the canal through Culebra Cut and cannot be used to advantage until the excavation in the cut is completed. From Gatun to Gamboa, however, the work must be pushed in order that the operation of the railroad may not impede the canal construction and that railroad traffic may not be interfered with by the water in Gatun Lake. Between Paraiso and Corozal, a distance of about five miles, there is comparatively little work to be done, and this will be completed as soon as possible, as the traffic over the main line between Paraiso and Corozal is daily increasing. The purpose of completing this section of the relocation at an early date is in order that it may be used for the Panama railroad trains, and the present main line may be turned over to the construction trains.

Eight miles of construction track have been laid in the section between Caimito and Gamboa Bridge and the grading is being pushed north toward Frijoles. The line lies across the valley of the little rivers that flow into the Chagres from the east side of the watershed, and the construction is therefore alternate cut and fill, with the proportion of embankment largely in excess of the cuts. A part of the embankment was made by driving trestle and filling with spoil from Culebra Cut. Over 12,000 ft. of trestle have been built, and most of it has already been filled.

When Gatun Lake is at its normal level of 85 ft. above the sea, all the valleys crossed by the relocated line will be filled with water on both sides of the track up to that elevation. As there is a large predominance of embankment the railroad will present the appearance of having been constructed on a series of fills that connect an alternate series of peninsulas projecting into the lake. All the valleys, excepting the Gatuncillo and Chagres, are being bridged with reinforced concrete culverts kept below subgrade, so that there will be a continuous roadbed over the openings.

The Chagres is already spanned by the bridge at Gamboa and the Gatuncillo will be crossed by a bascule bridge, which will give access to the large lake area east of the railroad. This bridge has been authorized, although the details have not been completed to the point where bids can be requested. The clear channel when the lift is up will be broad enough to permit of the passage of any ship that can pass through the canal locks. In other words, the upper lake basin will be accessible to ships larger than any now afloat.

Several smaller rivers are crossed requiring arch culverts of large size, and as the elevation at which the road is being built is high above the stream beds, many of the culverts are very long. Two of these large culverts may be seen from the operated line between Pedro Miguel and Miraflores. They are built of concrete, have a 20-ft. span, and are 24 ft. high. Longer than these but otherwise the same are the culverts over the Juan Grande, Frijoles, Frijolita, and Aqua Salud rivers between Gamboa and Gatun.—The Canal Record.

Pennsylvania Railroad Accidents

Reports just compiled of all accidents on the 23,000 miles of track of the Pennsylvania Railroad System for the past year, show that during 1908 the various lines of the System carried 141,659,543 passengers, and that not one single passenger was killed as the result of an accident to a train.

During the year the lines of the System carried 11,344,413 less passengers than in 1907—a loss of 7.4 per cent, but the total number of passengers injured in train accidents numbered only 102, a reduction of 452 or 81.6 per cent from 1907. These figures include every case requiring surgical or medical attention, however trivial. It will thus appear that, counting every personal injury due to train wrecks, only one person out of every 1,388,819 passengers carried was injured.

The number of passengers traveling a distance of one mile during the year was 3,457,671,462, so that for each passenger carried one mile, the proportion was 33,898,739 carried in safety to one injured.

The passenger trains of the Pennsylvania System during 1908 traveled 58,440,449 miles. The fact that the millions of passengers carried were handled with such safety is made more significant by the fact that along

side the pasesnger trains, freight trains were operated for a total of 60,293,996 miles.

Statistics for the Pennsylvania Line East of Pittsburg, directly operated, show a total of 88,328,604 passengers carried in 1908, and but 51 injured in train accidents. Passengers carried one mile numbered 2,148,457,351, so that 42,126,614 passengers traveled one mile before any one was injured through a train wreck.

On the Lines West of Pittsburg, directly operated, 22,314,209 passengers were carried during the year, and there were but 17 injured as the result of train accidents. Thus the chances were 1,312,600 to one that every passenger who started upon a journey during the year would reach his destination in safety.

Of the subsidiary lines, independently operated, the record of the Long Island Railroad is most striking. That line carried during the year 23,242,838 passengers and only 17 were injured in train accidents. Passengers carried one mile numbered 352,228,060. This line has now been operated for some fifteen years without a fatality to a passenger, due to a train wreck.

Cinder Pits

Editor, Railway Engineering:

Handling ashes at the round house—the plan we follow here is to shovel the ashes from the pit to the car. The pit is open on one side, and the top of the car is about two feet higher than the bottom of the clinker pit. Our men are allowed so much per engine for handling these ashes, and we find it amounts to about 6 cents per cubic yard. The force doing this work at Galesburg consists of five men, days, and five men nights. Their earnings will run from 17½ to 18½ cents per hour.

Yours truly,

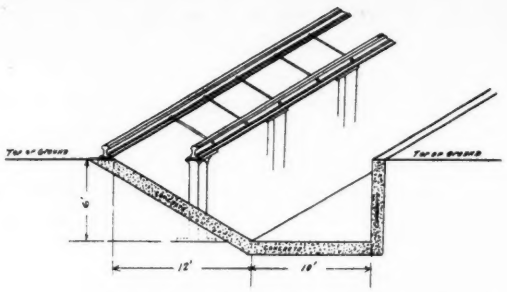
Illinois. Master Mechanic.

Editor, Railway Engineering:

We handle approximately 500 engines over this pit each month and use two men, one working days and one working nights, to clean the ash pans and shovel the cinders over into the open part of the pit where the locomotive crane can get to them when loading. The salaries of these two men are of course the bulk of the expense of handling the cinders, and most of their time is employed in cleaning ash pans which will be eliminated when all locomotives are equipped with self-dumping ash pans. These two men are each paid at the rate of $50.00 per month, making a total of $100.00 per month for labor. The cost of loading one month's accumulation of cinders by locomotive crane will not exceed $4.50, being made up as follows:

Salary of crane engineer	$2.00
Cost of fuel	1.00
Cost of lubrication	.50
Cost of maintenance of crane	1.00
	$4.50

In regard to the locomotive crane I wish to advise that this is used almost exclusively in handling fuel



Fit 60' Long 6' Deep 11 Pedestals Set 6' apart for rails to rest on.

for locomotives, only a small part of its time being taken up by the loading of cinders. The crane we have is a No. 1 crane with 1½ yard bucket, built by the Browning Engineering Co., of Cleveland, Ohio.

In connection with this crane we use one engineer and a helper who attends to the placing of the bucket when coaling engines out of cars. No coal whatever is handled by hand and the average cost of coal handled for the year 1908 was seven cents per ton, while if it were handled by hand it would cost on an average of between 20 and 22 cents per ton.

The sketch shows the general plan of our cinder pit.

Yours truly,

Indiana. Master Mechanic.

Editor, Railway Engineering:

Cinders on this division are handled with a plain depressed track cinder pit. We just use the ordinary depressed track pit, raking the ashes from the ash-pans into the cinder pit, cooling them off, then shoveling them from the pit to the cinder cars on the track which is depressed below the floor of the cinder pit so that the cinder pit men will not have to lift the cinders too high.

The pit is just a common depressed cinder pit. I have never had any experience with cinders handled with a locomotive crane or any other kind of hoist.

The cost is a variable quantity with us, not depending on the number of engines handled in the 24 hours. We use two men in the cinder pit to rake the ashes from the ash-pans. This is necessary because most of the engines have the divided pans. It would not work well to try to clean an ash-pan with one man, as it would make it necessary for him to go from one end of the engine to the other, as the cinders were dumped; therefore the labor remains the same whether we have few or many engines.

Yours truly,

Michigan. Master Mechanic.

Proposed Demurrage Rules

A sub-committee on car demurrage of the National Association of Railway Commissioners has drafted a car demurrage code which will be discussed at a general public hearing in the rooms of the Interstate Commerce Commission in Washington on June 4 and 5. All communications regarding same should be addressed to Mr. Allan P. Matthew, secretary, in care of the Interstate Commerce Commission, Washington, D. C.

Rail Pressures and Stresses in Track

By E. E. Stetson

A LOCOMOTIVE when rounding a curve exerts certain forces which produce stresses in track that do not exist on a tangent. These forces arise from two causes: centrifugal force, and forces arising from the tendency of the locomotive trucks to continue in a straight line. They may be further classified into three fundamental forces:

(1) Net effect of centrifugal force (superelevation of outer rail considered).

(2) Lateral slipping or component of slipping in direction of radius due to curvature.

(3) Longitudinal slipping or component of slipping in direction of tangent of track due to unequal rail lengths inside and outside.

These forces are resisted by the pressure of the flange of the outer wheel against the rail, thereby producing a horizontal thrust against the outer rail. This thrust in turn is resisted by friction of base of rail on ties or tie plates, and resistance of fastenings to shearing and resistance of wood to crushing behind spikes. It is therefore necessary to compute the magnitude of this flange pressure or horizontal thrust and then find the resultant horizontal force acting on heads of spikes at a tie. The method of computing this force, and upon which all the calculations have been based, will now be outlined.

The first step is to compute the wheel loads on the rail from the given axle load for a given degree of curve, speed and superelevation. In computing these wheel loads, the assumption has been made that the height of the center of gravity of the total axle load above rail is equal to the height of the center of gravity of the whole locomotive above the rail. Starting with this assumption, the height of the center of gravity of the spring-supported portion of the load above the axle is computed for each axle. The centrifugal force is considered applied at this point and is combined with spring-supported load. The resultant is resolved into two components at the point where it intersects the axle, normal and tangential to the axle. The part of the normal component carried by each wheel is next computed, and the total wheel load then found by adding one-half the weight of axle and wheels to each.

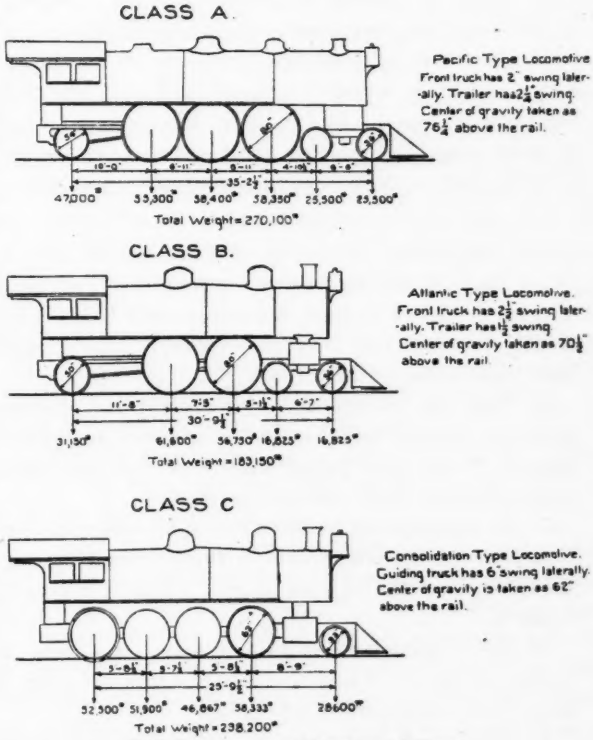
Computations have been made for the three different classes of locomotives according to the method just outlined for sixteen different cases, and a tabulated statement of results is given in the accompanying print marked Table 1. The results given for the Class A locomotive are those obtained under the assumption that the flange on the outer wheel of the middle driver does not bear against rail. For some of the cases considered this is, undoubtedly, not true, for assuming the play of driver in hub to be ⅛-in., which is the amount of play given them when first put in service, then for all curves of less degree than 2 degrees 30 minutes it is possible for flange of middle driver to bear against rail. Taking play in hub as ¾-in., it will be possible for flange of middle driver to bear against rail on all curves of less degree than 15 degrees 0 minutes. Owing to uncertainty of the amount of play, however, it was thought best to give here the results obtained from assuming that in no case will the flange of middle driver bear against rail

In computing the maximum shear on fastenings, the horizontal thrust has been assumed to be distributed by the rail over two ties. This is a very conservative assumption, for it seems very reasonable to suppose that the stiffness of the heavier weight rails will distribute the pressure over three or more ties.

In comparing the effects of the three types of locomotives it is seen from the table that with regard to thrust against rail at outer wheel of front driver, Class C gives results about 20 per cent higher than the Class A or Class B type, while the thrust produced by the Class A and Class B engines are approximately the same. It can be easily understood how the stress produced by the Class C engine should be greater than that produced by the Class A or Class B, since it has a much longer rigid driving-wheel base and a greater number of wheels to be slipped than the other two. It is not so self-evident, however, why the forces ex-

DIAGRAM OF ENGINES

Showing Axle Loads and Dimensions of Wheel Bases.



Rail Pressures and Stresses in Track.

*Extracts from paper in Bulletin 104 of the American Railway Engineering and Maintenance of Way Association.

erted by the Class A locomotive are no greater or so little greater than those exerted by Class B, since the former has a longer rigid wheel base, a greater number of drivers and a greater total weight than the latter. This may be explained by the difference in amount of loading on, and arrangement of, the guiding and trailing trucks in the two types. The Class A engine has a much greater weight on its guiding trucks than the Class B. Also the distance from the rear driver to trailer in the Class A type is much less than the distance in the Class B. In short, the effect of the guiding and trailing trucks, which tends to reduce the thrust at the front driver, or what may be called the guiding effect in the Class A type of locomotive, is about double what it is in the Class B type. With regard to thrust against rail at outer front wheel of guiding truck, it is seen from the table that the Class A guiding truck produces results about 50 per cent. larger than Class B, and about 35 per cent larger than Class C.

The maximum shear on fastenings in one tie, in nearly every case where there is no unbalanced centrifugal force, is produced by a Class A locomotive, while in cases where there is unbalanced centrifugal force, Class C produces maximum shear.

It will be noticed from the table that the maximum shear on the fastenings in one tie is 8,800 lbs., and is produced by a Class C locomotive rounding a 4-degree curve, the outer rail of which is elevated 8 in., at a speed of 70 miles per hour, a speed which is not likely to be reached by this class on that degree of curve.

It will be noticed in the preceding table that in nearly every case the horizontal force exerted at outer front wheel of guiding truck decreases very slightly as the speed and curvature are increased. This is due to the fact that as speed and curvature are increased, weight on inner wheels decreases, and they are then more easily slipped. The resultant force acting on rail at outer wheels of guiding truck increases, however, in every case with increase in speed and curvature.

TABLE I.

Degree of Curve	Speed in Miles per Hour	Superelevation of Outer Rail	Speed Corresponding to Superelevation	Thrust Against Rail at Outer Wheel of Forward Drivers			Thrust Against Rail at Outer Front Wheel of Guiding Truck			Maximum Shear on Fastenings in One Tie, Assuming Thrust Distributed over Two Ties		
				Class A	Class B	Class C	Class A	Class B	Class C	Class A	Class B	Class C
1	60	2.43	60	11120	11500	13180	9520	5970	6900	3160	2200	2940
	70	2.43	60	12830	12950	14700	9420	5960	6910	3060	2870	3630
2	60	4.87	60	11160	11520	13250	9520	5970	6900	3150	2200	2970
	70	4.87	60	14340	14380	17400	9320	5920	6910	3370	3520	4915
3	60	7.30	60	11200	11570	13600	9500	5980	6900	3120	2190	3125
	70	7.30	60	16360	15870	19400	9220	5880	6910	4280	4180	5825
4	40	4.32	40	11140	11550	13050	9470	5940	6850	3100	2220	2870
	50	6.76	50	11180	11580	13300	9480	5950	6870	3100	2220	2980
	60	8.00	54.4	16850	14320	17750	9350	5920	6820	4600	3690	5075
	70	8.00	54.4	21400	20200	25800	8930	5800	6960	6590	6150	8800
5	40	5.41	40	11170	11530	13100	9420	5940	6840	3070	2220	2895
	50	8.00	48.7	12550	12300	14500	9370	5940	6850	3100	2550	3540
6	40	6.48	40	11200	11550	13400	9400	5940	6800	3050	2210	3030
	50	8.00	44.4	15320	15080	18400	9200	5900	6880	3810	3810	5360
7	40	7.57	40	11300	11600	13500	9370	5900	6800	3020	2220	3070
	50	8.00	41.2	18850	18150	22500	8890	5840	6880	5430	5230	7290

Rail Pressures and Stresses in Track.

CONCLUSIONS.

The conclusions arrived at from this study are:

1. That horizontal forces exerted upon rail and stresses produced in track fastenings by a Class A locomotive in rounding curves are but very little greater than those obtained by a Class B locomotive.

2. That the horizontal forces exerted and stresses produced in track by a Class C locomotive are approximately 20 per cent larger than those obtained from either a Class A or Class B locomotive.

3. At same speeds on same curve, at outer wheel of front drivers, the resultant is farthest beyond the center of base of rail in this order: Class C, Class B, Class A.

At the outer wheel of guiding truck this order is exactly reversed: Class A, Class B, Class C. Class B and Class A are very nearly alike.

4. If Class B and Class A are run around curves up to 3 degrees at 60 miles per hour, the Class C should not be run around any curve faster than 40 miles per hour, in order not to have the distance of the resultant force from center of base of rail exceed that given by the first two locomotives.

5. The maximum shear on the fastenings in a tie, in nearly every case, is produced by a Class A locomotive when the centrifugal force is balanced, and by a Class C when the speed exceeds that for which the outer rail was superelevated.

6. The horizontal forces at the head of the rail and the resultant of the horizontal and vertical forces at the same point are greater at the outer wheel of front driver than at the outer front wheel of the guiding truck for all three locomotives.

7. That the horizontal forces exerted and stresses produced at the outer front wheel of the guiding truck of a Class A locomotive are about 50 per cent larger than those produced by a Class B, and about 35 per cent larger than a Class C.

8. In nearly every case the horizontal force exerted at the outer front wheel of guiding truck decreases very slightly as the speed and curvature increase, but the opposite is true in the case of the outer wheel of the forward driver.

9. In every case the resultant force acting on the rail at the outer wheel of the guiding truck increases with increase of speed and curvature.

10. At outer wheel of front driver for Class A, Class B, and nearly for Class C, resultant force and position at base of rail are the same at 60 miles per hour for 3 degrees and under, centrifugal force balanced.

Resultant force and position at base of rail are the same at 40 miles per hour for 4 degrees, 5 degrees, 6 degrees and 7 degrees, centrifugal force balanced.

The above two do not hold for unbalanced speeds.

11. In many cases on curves the resultant force acting on rail passes entirely outside of base of rail. At the guiding truck of the Class A and Class B, this happens in nearly every case. It also occurs at the outer wheel of front driver for all three locomotives, in the cases of greatest curvature and speed.

12. At guiding truck for Class A and Class B the resultant falls outside of base of rail in all cases but two for A. S. C. E. rail and in all cases for Pennsylvania System rail; but for the Class C it falls inside in all cases.

At the outer wheel of front driver for Class A and Class B the resultant falls within the base of rail for speeds up to about 60 miles per hour on curves up to 3 degrees; up to about 50 miles per hour for 4 degrees and 5 degree curves, and up to 40 miles per hour on 6 degree and 7 degree curves. For Class C only for speeds up to 40 miles per hour.

13. In all kinds of wood ties the wood back of a spike will crush before a sufficient force can be exerted on an ordinary 5/8-in. spike to shear it off.

(14) The present practice of putting two spikes on inside and one outside of the outer rails on curves when tie plates are used, gives ample strength against shearing of spike, but not a very large factor of safety against crushing of wood back of spike.

The factor of safety against crushing when flat tie plates are used is, for catalpa, 1.2; for cedar and chestnut, 1.4; for beech and white oak, 1.9; and for yellow pine, 2.1. When Goldie claw plates are used the factor of safety is, for catalpa, 1.9; for cedar and chestnut, 2.3; for beech and white oak, 3.1; for yellow pine, 3.5. For the above case, the Goldie claw plates give about 60 per cent larger factor of safety than flat plates.

In connection with this conclusion, it should be remembered that the ultimate crushing strength of the different woods were taken from tests made under conditions different from those we have in the case of a spike in a tie.

15. The present method of fastening rails to wood ties is weak with regard to liability of crushing wood back of fastenings.

Pennsylvania Railroad Officials

The newly constituted Board of Directors of the Pennsylvania Railroad Company, at a recent meeting, re-elected Mr. James McCrea to serve as president for the ensuing year. Mr. Lewis Neilson was re-elected secretary.

Mr. John P. Green declined re-election as first vice-president, in order that the official changes consequent upon his impending retirement, under the pension regulations of the company might take place at this time.

Mr. Chas. E. Pugh, previously second vice-president, was accordingly elected first vice-president and director, in charge of the pension, insurance, real estate and purchasing departments.

Mr. J. B. Hutchinson, previously assistant to the second vice-president, was appointed assistant to the first vice-president.

Mr. Samuel Rea, previously third vice-president, was elected second vice-president and director, in charge of the engineering and accounting departments.

Mr. A. J. County, previously assistant to the third vice-president, was appointed assistant to the second vice-president.

Mr. C. M. Bunting, previously assistant to the first vice-president, was appointed assistant comptroller.

Mr. J. B. Thayer, previously fourth vice-president, was elected third vice-president and director, in charge of the traffic department.

Mr. Henry Tatnall, previously fifth vice-president and treasurer, was elected fourth vice-president and director, in charge of the company's finances.

Mr. J. F. Fahnestock, previously assistant treasurer, was elected treasurer.

Mr. W. W. Atterbury, previously general manager, was elected fifth vice-president, in charge of the transportation department.

Mr. W. Heyward Myers, previously general superintendent of the Northern Central Railway and Erie Division, was appointed general manager.

Mr. H. M. Carson, previously assistant to the general manager, was appointed general superintendent of the Northern Central Railway and Erie Division.

Mr. J. G. Rodgers, previously superintendent of the New York, Philadelphia & Norfolk R. R. Co., was appointed assistant to the general manager.

All of the other officers of the company were reappointed for the ensuing year.

Bark Affects Penetration of Wood Preservatives

The government has gone into the study of every phase of wood preservation, and as progress is made in new experiments, important facts are brought to light which heretofore have been given little or no attention. One of the features in the work of wood preservation which has been neglected is the effect of patches of inner bark on wood in preventing proper penetration of preservatives.

Before timber is subjected to preservative treatment, it is customary to remove the bark. Unless this is done very thoroughly, however, patches of the inner bark will remain on the wood. This thin inner bark or skin adheres very closely, and is difficult to remove without the use of a drawing-knife, unless the timber is cut when the "sap is going up."

Until recently, it does not seem to have been realized that this bark presented a very effectual hindrance to the penetration of creosote. In conducting some tests on the treatment of pine in Louisviana and Alabama in 1907 and 1908, it was noticed by a representative of the Forest Service that very little or no creosote entered the wood through even the thinest layer of adhering bark.

Railway Tie

A railway tie was invented by Harry C. Bennetch, Cocalico, Pa., and he describes the invention as follows:

The invention relates to an improvement in ties, and particularly to a tie and rail supporting means arranged in cooperation therewith.

The main object of the present invention is the provision of a tie and rail supporting means so relatively constructed that the rails may normally yield laterally under certain conditions, the arrangement of parts serving to normally and automatically maintain the proper gauge of the rails.

The invention will be described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a view in vertical section, partly in elevation, showing my improved tie and rail supporting means therefor. Fig. 2 is a plan of the same. Fig. 3 is a perspective of the tie and rail supporting means, the parts being shown separated.

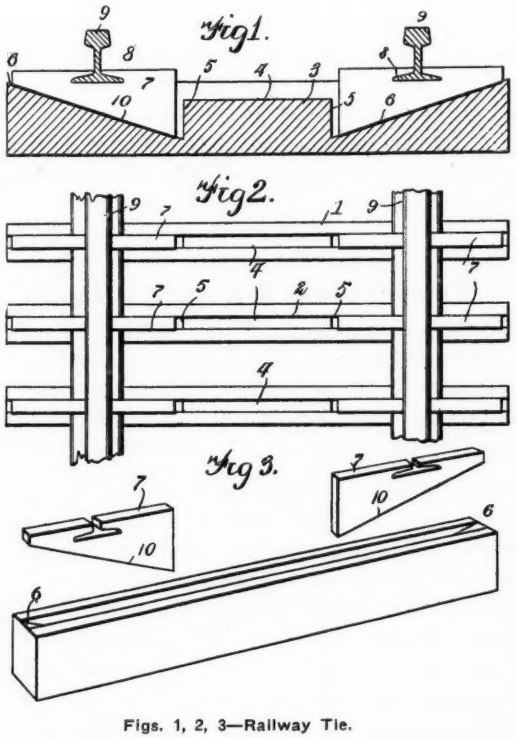
Referring particularly to the drawings, in which is shown one form of the improvement, the tie 1 comprises an elongated body of any desired material or sectional contour. The tie is formed with a longitudinally disposed comparatively narrow recess 2 side walls disposed in spaced parallel relation. The opening through the ends of the tie and having the bottom wall of the recess is of peculiar shape, and it is in this particular shape that the present improvement resides. Centrally of the tie the bottom wall of the recess is formed to provide a central abutment 3, the upper wall 4 of which is preferably on a plane somewhat below the normal upper surface of the tie, and the end walls 5 of which abutment are disposed at a direct right angle to the upper surface of the tie. From the lower edges of the end walls 5 the base or bottom wall of the abutment projects at an outward and upward incline, as at 6, terminating at the ends of the tie in practical coincidence with the upper surface of the tie, as shown in Fig. 3. The inclined portions 6, which form the operative portions of the base wall of the recess, are disposed at a pronounced incline, as shown in Fig. 1, the end walls 5 of the central abutment providing limiting shoulders for the inner or lower ends of the inclined ways 6.

Cooperating with the tie are sleepers or chairs 7, formed at 8 for relatively fixed connection with the rails 9, said chairs being slightly less in thickness than the width of the recess 2, so that said chairs are adapted for insertion and free sliding movement within the recess. The chairs are of approximately right angle triangular shape, with the side 10 corresponding to the hypotenuse of a triangle having the same relative inclination as the ways 6 of the tie. The chairs are adapted to fit in the recess 2 of the tie, the inclined side 10 of the chair resting on the respective inclined ways 6.

The parts are so arranged that when the base flanges of the rails 9 rest upon the upper surface of the tie, said rails are properly gaged, it being obvious in this connection that the rails owing to the free movement permitted the chairs with respect to the tie may move outwardly from each other, but are limited as respects inward movement beyond that point at which the rails will engage the upper surface of the tie.

The advantage of the construction described is that either rail may yield outwardly under extreme pressure to increase the normal gage between the rails. Owing, however, to the fact that any outward yielding of a rail must force the chair 7 connected to that rail up the pronounced incline 6 of the tie and that this comparatively upward movement of the rail is resisted by the entire weight of the train, it is, of course, obvious that the rail will be so moved only under excessive pressure, as in the passing of a truck or set of wheels having a slightly wider gage than normal. Immediately the pressure is released the weight of the train will tend to instantly restore the normal gage.

The present invention is directed to a means for mounting railroad rails to permit their independent movement from each other while such movement is resisted by the weight of the vehicle traveling on the rails. The illustration as well as the detailed description thereof is intended simply as an example of an ordinary form of the invention, and it is to be understood that the invention, being broadly directed as above expressed is not to be restricted to the form shown and described.



Figs. 1, 2, 3—Railway Tie.

As this is the drawing as it issued from the patent office the method of fastening the rail is not shown here but that is of minor consequence to the importance of the other features of the patent. It is suffice to say here that I have several methods which I consider equal or superior to the present method.

I claim my invention to possess these features which are among the aims of all those concerned in the care of tracks.

1. A more permanent track as in the case when concrete or steel is used as the tie material.
2. Safety from spreading
3. Enough springiness to prevent shearing as in the case when steel is used as tie material.

World's Tercentennial Exposition

The Boston Herald published recently the first announcement of the inception of a movement to commemorate the three-hundredth anniversary of The Landing of the Pilgrims and the Founding of New England by a World's Tercentennial Exposition in Boston in 1920.

"New England alone, of all parts of the Union, has never had its World's Fair; and it is believed that the national and universal interest in the historic event which the Exposition will commemorate will command the enthusiastic approval and support of the American people of all sections and of all classes.

"This early announcement has been deemed necessary in order that the world shall know that the United States reserves the year 1920 for a World's Fair; and that Boston and New England will give the intervening years to plans and preparations for an exposition on a scale and magnitude commensurate with the importance of the event which was the birth of the American nation."

Wood Preservation

In recent years the importance of preserving timber from decay by the use of various antiseptics has been generally recognized in the United States. The value of properly seasoning timber before such treatment is not so generally known, though it is one of the most important features of the treatment.

There are three main advantages to be derived from the proper seasoning of timber, namely: The increase in strength of the timber, the greater ease of injection of antiseptics for preserving the timber, and the saving in freight charges due to the decreased weight.

From thorough tests made by the Forest Service on various pieces of timber, it appears that thoroughly air-dry or seasoned timber has about double the strength of the green material. It is well known to all operators of wood-preserving plants that antiseptics are not only difficult to inject into green wood, but that it is practically impossible to obtain a uniformly satisfactory treatment of such material at an economic cost, for the purpose of insuring a prolonged life.

The last item would at first seem too trifling to be worthy of discussion, but from data obtained only recently it appears that western yellow pine lost 50 per cent of its green weight after three to five months seasoning. This means a saving of 50 per cent of the freight charges and a corresponding saving in the handling of the timber, and is therefore a far too important point to overlook.

Considering these three points, it will be seen that there is not only a material saving in the seasoning of timber, but also a proportionate increase in the value of timber as a structural material. The seasoning of timber is never an expensive operation, even when done artificially. In the southern parts of the United States, a satisfactory degree of seasoning could be obtained by exposure of the timber to the air for a period of three to six months. In some of the northern states, however, a somewhat longer period is necessary to secure satisfactory results.

Open Hearth Steel Rails

A shipment of 1,300 gross tons of open hearth steel rails manufactured by the Bethlehem Steel Company arrived at Cristobal last week for the Panama railroad. The consignment is composed of 1,000 gross tons of 70-pound rails and 300 gross tons of 90-pound rails. The 70-pound rails will be laid on the permanent line between Colon and Gatun and between Corozal and Panama. The old 70-pound rails now in use between these points will be used in construction work on the relocated line. The new 90-pound rails will be used on the sharp curves between Las Cascadas and Tabernilla to replace the 90-pound Bessemer steel rails that have been in use on these curves. Owing to the heavy traffic on this section of the railroad the 90-pound Bessemer rail has been worn out in from ten to twelve months. The chemical composition of the open hearth rail is as follows:

	70-pound, Per cent.	90-pound, Per cent.
Carbon	.65 — .75	.70 — .80
Phosphorus, shall not exceed	.035— .04	.035— .04
Silicon, shall not exceed	.20 —	.20 —
Manganese	.80 —1.05	.80 —1.05

The uniformly high temperature of the climate on the Isthmus is especially favorable for the use of the high carbon rail and it will give excellent service on account of its hardness.

The Panama Railroad Company has also ordered 165 pairs of switch points, 600 sheared splice bars, 120 rigid frogs, 103 spring rail frogs, 4 double spring frogs, and 2 manganese frogs, all to be of open hearth steel and to be used at various points where the heavy traffic demands it. It is expected that they will be delivered on the Isthmus in the near future.—May 5, 1909, The Canal Record.

Rail Joints

Editor, Railway Engineering:

My experience has been limited almost altogether to the ordinary angle bar, although in the past year or two I have used some continuous joints, not long enough, however, to form a fair opinion of their merits.

The ordinary angle bar is, I believe, a very satisfactory splice for the first few years of its service, its chief objections being when it becomes old and worn allowing too much play between the head and flange of rail. Also another objection to this type is that very frequently it breaks at the joint.

We are at present using a six-bolt, 29-inch joint of this type for the heavier rail, and in my opinion this is a satisfactory length.

Under average traffic and average alignment an ordinary angle bar should, in my judgment, give good service for 10 years.

The Continuous joint is, I believe, a much better joint and will give better service when it becomes old than the angle bar, although I can see no difference in the first two years. The superiority in the Continuous joint lies in the base support. We are using a four-bolt, 22-inch joint of this type, but I would prefer a 24-inch joint. This joint should cause less wear on the rail by reason of the base support.

We are using the Verona nut lock on all of our splices and I am inclined to think that this kind of a nut lock is as simple and satisfactory as can be had.

Yours truly,

Kentucky. Roadmaster.

TRADE NOTES.

"Quality Telephone Cords" is the title of a carefully and completely illustrated bulletin (No. 47) just issued by the Kellogg Switchboard & Supply Co., Chicago, Ill. The illustrations of the cords are very accurate and much above ordinary cuts of this kind, being halftones made direct from the subject. Each grade and class of cords is given with careful description and price, arranged for the convenience of buyers. The bulletin also shows views of the machines on which the cords are made from the first step to the finished cord, which gives an idea of the size and completeness of equipment of the Kellogg factory. The bulletin will be sent to those interested upon request.

George W. Jackson, Inc., has issued a very interesting booklet on the Jackson Patented Steel Forms for concrete construction. The illustrations are exceedingly good.

The Traffic Service Bureau has moved its Chicago office to 316-319 Royal Insurance building, Chicago. The vice-president's office wil be located in Washington, D. C., and Mr. W. B. Barr, now freight and passenger agent of the Chicago Terminal Transfer Railroad, will resign his position to take the vice-presidency.

The Detroit Graphite Company, paint makers, are now located at 135 Broadway, New York, where larger quarters have been secured to meet the requirements of their eastern business.

The Northwestern Expanded Metal Company, of which Mr. Ernest McCullough is chief engineer, has issued a very neat booklet containing "Beam and column data."

The Advance Advocate is now located in the Vanol building, St. Louis, Mo.

The Williams Boltless Rail Joint Manufacturing Company, Chicago, printed a very clever card illustrating their boltless rail joint.

The Gisholt Machine Company, Madison, Wis., recently issued a new circular on their 36-inch boring mill for finishing locomotive eccentrics.

Surerus & Greenhill, tool makers and engineers, are now located at 267-269 E. Division St., Chicago.

Circular 1502, issued by the Westinghouse Electric & Manufacturing Company, contains much valuable information on alternating current distribution, covering transformers, lightning arresters, insulators, cross arms, etc. Considerable space is devoted to underground and overhead construction applicable to congested and scattered districts. There is also given information on potential regulating systems. The circular contains 52 pages of information of value to any central station man or any other connected in any way with the distribution of power by alternating current lines.

What might be called a pocket edition general catalogue has just been gotten out by the Joseph Dixon Crucible Company, of Jersey City, N. J. This lists their principal products, such as crucibles, facings, lubricating graphite, greases, pencils, protective plant, etc., giving brief descriptions and prices. It is of value to the purchasing agent, engineer, contractor, superintendent, and any one, in fact, who uses or specifies graphite in any form. The booklet is of commercial envelop size, and will conveniently go in the pocket or desk pigeonhole. It is substantially bound in tough cover stock, and attractively printed. If you want a copy address the Dixon company at their home office and mention this publication.

The Watson-Stillman Company has just introduced a new reversed cylinder forcing press, which should prove a handy tool for pressing bearings and for miscellaneous work. As will be seen from illustration, a crane bracket and beam extending from one end enables the operator to swing a heavy piece of work onto bracket shelves extending out from each side of the bottom platen. These shelves, 30 inches long by 12 inches wide, are detachable, can be lifted off on jobs where they would be in the way, and are sufficiently strong to support any work that will go into the machine. They will be appreciated by those who have had to push castings or parts into place on the ordinary small platen.

The improvement in the business of the Westinghouse Machine Company's shops at East Pittsburg, which has been noticeable for several months, continues in the most encouraging degree. Since the first of April quite a number of orders for steam turbines, steam engines and gas engines have been booked, and the record for the first two weeks of this month shows a considerable increase over the same period of March. With the anticipated closing of quite a number of contracts for which negotiations are now pending, the indications are that the April business will make an excellent showing. Among the contracts particularly worth mentioning which the company has lately received is an order from the City Electric Company, of San Francisco, for a 15,000-horsepower steam turbine. This will be the most powerful steam turbine installed west of the Mississippi, its power capacity being about equal to ten of the largest size express railway locomotives. The company has already installed three Westinghouse steam turbines of a smaller size. The East Pittsburg shops are also turning out at present on order from the City of Detroit a 5,000-horsepower steam turbine, and another of the same size is going to Nichols Copper Company, of Laurel Hill, Long Island, while the Saginaw & Flint Railway Company, of Michigan, has contracted for an 1,150-horsepower turbine and the Alaska Treadwell Gold Mining Company, of San Francisco, has ordered two 1,000-horsepower machines of the same type.

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